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are most favorably known among mathematicians were founded by Teixeira. The older of these, entitled *Jornal de sciencias mathematicas e astronomicas*, was founded in 1877. It was superseded in 1905 by the *Annals Scientificos da Academia Polytechnica do Porto*, which is not restricted to mathematics, but has thus far devoted considerable space to this subject. The second number of the current volume begins with an article by P. Appell on the deduction of the polynomials of Hermite from those of Legendre.

From what precedes it is evident that the youngest sister republic cannot be classed with the foremost mathematical countries of the world, but it is equally true that, if we consider her size and population, she has made a very respectable record and is doing so at the present time. It is to be hoped that the new form of government will tend to elevate the educational opportunities of the masses and to put new life also into the higher institutions. In the sixteenth century Lisbon was one of the intellectual centers of Europe, and the later scientific achievements under adverse conditions inspire the hope that with the improvement of these conditions there may come a return of intellectual eminence. Even at the present time some of the Portuguese literature has decided value, both for the investigator and also for those who seek general mathematical knowledge.

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## ON THE NEW COURSE IN MATHEMATICS IN THE JAPANESE NORMAL SCHOOLS.

By YOSHIO MIKAMI, Phara in Kazusa, Japan.

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The Department of Education of the Japanese government recently issued a new course in mathematics for the normal schools; that is, for the schools where the teachers of the primary schools are educated. The courses for men students are not the same as those for women. We begin by giving a brief account of the former.

The course consists of two parts, requiring one and four years respectively. In the former of these (the preliminary course) six hours per week are devoted to mathematics, while the number of hours devoted to this subject during each week of the remaining four years are respectively four, three, three, and two. Hence the total number of hours devoted to mathematics in these normal schools is somewhat less than that of the middle schools.

The six hours of mathematics in the preliminary course are devoted to arithmetic, such as is taught in higher primary schools.\*

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\*In Japan primary schools have two courses, ordinary and higher. The ordinary course lasts six years and the other two years. Children are admitted to the primary school when they reach their sixth year.

In the main course, considerable importance is attached to the practical side of mathematical instruction, emphasizing the connection between various branches of it as much as possible. In this respect the plan differs widely from the prevailing course for the middle school mathematics, where no connection between even arithmetic and algebra is attempted. The new plan is certainly a step towards improvement.

In the first year arithmetic and algebra are united under a common heading, and the subjects taught are integral numbers, the four fundamental operations, decimals, common fractions, negative numbers, integral expressions, linear equations. Geometry is also taught, its theme subjects consisting of the angle, parallels, triangles, and parallelograms, including the areas of rectilinear figures, and the circle. With geometry arithmetical calculations are associated.

In the second year arithmetic, algebra and geometry are all taught under a common heading. The subjects are fractional expressions and fractional equations, square and cube roots, quadratic equations, irrational equations, proportion, similar figures and areas.

In the third year the trigonometric functions of acute angles, together with the solution of triangles, arithmetic and geometric progressions and problems in interest are taught. Besides these, lessons on book-keeping and on the teaching of arithmetic for primary schools are given during the year.

In the fourth year algebra disappears and solid geometry alone is taught. Planes, solid angles, prisms, pyramids, circular cylinders, circular cones, spheres, and the volumes of these solids, are the subjects now considered. Arithmetical mensuration is particularly recommended to be associated with the subjects of solid geometry.

For the women students the preliminary course and the first and third years of the main course are provided each with one hour less than for the men. But all the subjects for the latter are preserved for the women. The only difference is that geometry is begun in the second year, the trigonometric functions are omitted, and that some parts are arranged differently. It will, however, be understood that the subject matter is considerably simpler than that for the men, since the women receive a smaller number of hours of instruction.

Besides the main course of four years, there are established simpler courses of two years and of one year. In the first year of the two years course mathematics is taught four hours a week, and in the second year three hours. Here the subject matter of the first and second years of the four year course is taught in the first year, and that of the third and fourth years in the second year. But it is evident that some parts are necessarily simplified, owing to the shorter time.

In the one year course all the main subjects of the four years of the main course are taught, only with simplifications and omissions.

In addition to the subjects mentioned above, mental arithmetic, the abacus arithmetic with the use of the *soroban*, and the geometrical loci and problems of construction are taught at convenient times. The *soroban* is an abacus that was introduced from China. Its introduction is believed by some writers to have been about 1600, but it may have been made at a far earlier period. However, it was since the middle of the seventeenth century that it was popularized in Japan. Although there was also another sort of abacus, the *sangi*, or calculating pieces, the sole help in daily use for calculations was the *soroban*; for the *sangi* were too cumbersome and better adapted to more complicated calculations. Even since the introduction of the Occidental style of calculation in the middle part of the last century, the *soroban* has not entirely disappeared, and it is still widely used. This is the reason why the *soroban* arithmetic is taught at present in primary schools, together with the Occidental arithmetic.

The adoption of the practical side of mathematical teaching in normal schools will certainly be against the wishes of those who insist that beginners should have theoretical instruction only. But this plan appears to prove successful in training young minds to the assimilation of mathematical ideas; it is especially in agreement with the development of the Japanese character which always looks towards the practical.

It is understood that the new course is not free from faults, but it is recommended to the teacher as a standard, and it is believed that the skill and the power of adaptation already displayed by the Japanese in so many directions will enable them to improve upon it and to develop eventually a still more complete and satisfactory plan. It is worthy of note that Japan is engaged in this development at the same time that all the peoples in the civilized world seem to be considering the possible improvements in the teaching of mathematics.

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## ON A MEAN DIFFERENCE PROBLEM THAT OCCURS IN STATISTICS.

By H. L. RIETZ, University of Illinois.

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1. *Introduction.* In making a comparison of the differences between the highest and lowest examination marks of a pupil in a given subject, with the corresponding difference for the same pupil in some other subjects, E. G. Dexter dealt with data such that, in one subject, say in mathematics, each pupil had ten distinct marks, while in another subject, say in Latin, each pupil had only two or three such marks. In this case, it seems reasonable to expect that, other things being equal, the extreme marks in mathematics would tend to differ more than the extreme marks in Latin.